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Military Compensation: When 50-Year-Olds Decide What 20-Year-Olds Want

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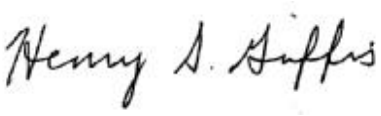

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Executive summary

Background

Congressional mandate requires the Department of Defense (DoD) to review its forces, resources, and programs every 4 years and present its findings to Congress and the President. This process, the Quadrennial Defense Review (QDR), is intended to be a long-term analysis of the nation's defense requirements and DoD's strategy to meet these requirements. As part of this review, the Office of the Under Secretary of Defense, Personnel & Readiness requested an overview paper on how DoD can improve military manpower management. Given increasing personnel costs and budgetary pressures to control spending, cost-effective manpower management has taken on additional importance.

In this paper, we evaluate the military compensation system and assess whether it is appropriately structured to support an All-Volunteer Force. We identify the goals that policy-makers are trying to achieve and discuss the extent to which the compensation system helps meet these goals. In addition, we discuss the extent to which DoD management practices reduce productivity or introduce inefficiencies in the execution of the military mission.

Findings and implications

Military compensation

Researchers have identified three objectives for military compensation. First, compensation needs to be able to attract and retain the right people. In addition, it needs to be able to allocate workers to different assignments. Finally, compensation should reward performance, and DoD should tailor compensation to reward personnel who give their best effort in performing their tasks.

We conclude that the military compensation package could be better aligned with what Servicemembers value. Potential recruits consistently mention training as one of the most attractive components of the compensation package, despite the fact that enlistment contracts obligate them for extended periods of service. However, training is a targeted benefit, making military service more attractive to those who desire additional training. Making this part of the compensation package multi-dimensional, so that it appeals to a broader cross section of potential recruits, would enhance the value of this part of the compensation package. Existing programs consistent with this are the Student Loan Repayment Program and partnerships with colleges to award credit to students for military training, coursework, and occupational specialty.

While training has great value for the youngest Servicemembers, the military retirement package has the greatest value for more senior personnel. Very few people choose to join the military because of the retirement benefit. Furthermore, the value that most recruits place on this benefit falls far short of the cost to the government of providing it. In addition, the cliff-vested nature of the retirement system directly affects the ability of the Services to meet its true requirements. Experience profiles of both enlisted personnel and commissioned officers are largely driven by Servicemembers who continue to serve until the point at which they are vested in the retirement system.

Two changes to retirement would increase its value to Servicemembers and improve its efficacy in influencing enlistment and retention. A relatively modest change would be to shorten the amount of time before vesting. A radical transformation of the system would allow the pension to be completely “portable”; this is very common in the private sector and has proved to be popular among workers everywhere.

Direct competition with the civilian sector has increased the need to provide opportunities for Servicemembers to exercise choice. An optimal compensation system would align with Service requirements and reward people who voluntarily choose to fill those requirements. However, current rotation policies can significantly detract from military service, particularly for married personnel. Frequent rotation has been shown to significantly lower income of

military spouses, and these policies ignore the fact that many people enjoy working in certain locations. Programs that allow personnel choice in their assignments would lower costs and improve the value of the overall compensation package. The Navy's use of Assignment Incentive Pay has shown early promise, allowing Servicemembers to express their assignment preferences and be compensated for them.

DoD could also provide more choice in reserve participation. A new paradigm of reservist participation, the Continuum of Service, centers on the recognition that people differ in their willingness and ability to accept activation and deployment. Expanding and developing both of these concepts would better align compensation with the strategic goal of allocating workers to different assignments in a cost-effective manner.

Finally, the Services in general appear to be retaining high-quality personnel. Despite some incentives for high-quality performance, there is room for improvement. Several components of the compensation package, including basic pay and reenlistment bonuses, could be realigned to provide direct, tangible rewards to Servicemembers for higher productivity.

Management of military personnel

We conclude that the current processes increase requirements. While requirements focus on the general military experience captured in length of service, the data suggest that specific experience in performing the tasks associated with the job is more important. Rotation policies increase turnover and directly reduce performance. While rotation does have some value, extending tour lengths would improve readiness and reduce the demand for junior, relatively inexperienced personnel.

Furthermore, units and commands do not have visibility into the compensation or full cost of military personnel. Units are not given information that allows them to know the total and relative cost of the personnel they request and use. In addition, personnel in training pipelines are not associated with a gapped billet in a unit. Consequently, units do not have an understanding of the effect of course length, time awaiting instruction, and time awaiting transfer

on lost productivity. We conclude that improving cost and asset visibility to individual units would result in a more efficient use of resources.

Finally, DoD faces several constraints that result in decisions unrelated to the military mission. Military personnel funds are expected to be spent in the year for which they are authorized, and policymakers make many choices that help the Department stay within the 1-year budget but not necessarily improve mission performance. Furthermore, each Service has both an endstrength and budget constraint, and these constraints are usually inconsistent in execution. More discretion in using military personnel funds would improve the cost-effectiveness of military manpower management. In addition, relaxing the endstrength constraint, while requiring the Service to abide by its budget constraint, would allow military leaders to choose a more cost-effective mix of personnel.

Introduction[1]

The objective of any military manpower system is to fill the ranks of its units with trained people. After World War II, the United States developed a mixed system of conscripts and volunteers to fill its ranks. For junior Army enlisted personnel, conscription was the principal means for acquiring people. Junior personnel in the other Services were frequently draft-induced volunteers; that is, they were choosing to not be in the Army. Many junior officers also were draft induced, as were most enlisted and officers in the Reserves. After the first term, the enlisted and officers in all the Services were true volunteers.

Whether intended or not, this mixed group—conscripts, draft induced, and true volunteers—contributed to a compensation system that provided the greatest benefits to those who had real choices to make. Benefits that were attractive to the more experienced (the "careerists") became significant parts of the compensation of our Servicemembers. Retirement, housing, additional allowances for those with dependents, and healthcare became fundamental parts of what the military offered. Targeting compensation to careerists made a great deal of sense; junior personnel were not influenced to serve by the military compensation package. Aligning pay and benefits with preferences of first-termers would have increased costs with little benefit in terms of recruiting or retention.

Despite moving to an All-Volunteer Force (AVF) in 1973, the structure of the military compensation system remained intact. As a result of the recommendations of the Gates Commission, substantial increases in pay were targeted to the population that had previously been conscripted or draft induced. However, the nature of the

[1] We presented an early draft of this paper at the 80th Annual Conference of the Western Economic Association. The paper has benefited greatly from the comments of Beth Asch, Steve Cylke, Henry Griffis, Albert Monroe, Walter Oi, and Jennie Wenger.

compensation package did not change and has not changed even to this day.

In this paper, we evaluate some key components of the compensation system and assess whether the compensation is appropriately aligned with personnel preferences. We begin by defining compensation and proceed with some thoughts on how well the current system does in attracting and retaining people, matching those people with the work, and providing incentives to improve performance. We discuss how some components of compensation add to, or subtract from, the value of the total compensation package.

We then discuss what could loosely be described as the demand side of manpower. We address whether current manpower requirements are the only, or most efficient, way to execute the military mission. We identify some practices that could be reducing the productivity of Servicemembers.

This paper draws heavily on Navy data. The intent is not to focus on Navy issues or to suggest that the Navy has more problems than other Services. Rather, we rely on the data with which we are most familiar. Other studies suggest that the Navy data are representative of the data of the other Services and that, in general, our conclusions apply to all of the Services.

What is *compensation?*

Since a good portion of this paper deals with compensation, it is necessary to define the term. For some in the military, placing the words *compensation* and *military service* in the same sentence is actually distasteful. These people see those who choose to serve their country as doing so for patriotic reasons and believe that the military should take care of them in a way that recognizes their sacrifices and minimizes their hardships. Those who discuss the rewards to military service and differences in relative compensation in cold economic terms are often seen as oblivious to the reasons many join the military and to the culture that both inspires risk taking and cares for those who take these risks. We believe that the disparity between this view and that of the economist is not as wide as some expect; however, the way these perspectives are articulated often leads to unnecessary disagreement.

The dictionary definition of *compensation* is "something given or received as payment or reparation, as for goods or services" [1]. This definition is quite general; it does *not* imply that remuneration be restricted to monetary payments. Anything that is given to the Servicemember by DoD in return for services can be correctly thought of as compensation. In short, it is anything of value associated with being a Servicemember.

Traditionally, direct monetary payments (i.e., wages and salary) are the prominent feature of a compensation package, and the wage or salary is what most people think of when discussing compensation. Having said this, we also recognize that non-wage-related compensation has a monetary value and changes the value of the compensation package. Non-wage-related compensation typically consists of annual leave, access to medical and dental benefits, and retirement benefits, to name a few. It is also not uncommon for compensation packages to offer childcare benefits, tuition reimbursement, or life insurance. In today's economy, many workers expect access to these

benefits, at generous levels, and consider such benefits important in choosing a job.

In the context of military service, compensation includes all things about service that people value. We begin with one of the most important aspects of the job—*the opportunity to serve one's country*. It is compensation in the fullest sense of the term, and it is why some people forgo civilian jobs with higher wages. To extend this concept, a job, a tour, or a career in the military has many attributes besides the monetary payments that Servicemembers receive. If someone is given an assignment that he or she particularly likes, the value to the individual of that service increases. In theory, a person could be given a "good" assignment in lieu of higher cash pay.[2] Conversely, assigning personnel to jobs they don't like, or forcing them to move their families to locations they don't, like actually takes something of value away from the Servicemembers and reduces their compensation.

The quality of assignments and the opportunity to serve are just two examples of non-wage-related compensation in the military. These terms are similar to what some in the military call *quality of life* or *quality of service*. Despite the connotation that compensation "is only about money," the word *compensation* really includes all that we consider under quality of life and quality of service.

In this paper, we focus on some attributes of military service that could be adjusted to improve the value of service to our Servicemembers. Since compensation is anything people value in their jobs or careers, it is important to appreciate that people differ in the job characteristics they value and in how much value they place on the specific characteristics. Diversity in individual preferences implies variation in the value of service. Again, relative preferences for assignments serve as a useful example. For one person, being assigned to work in a particular geographic location may align with that person's desires and be highly valued. For another, being assigned to

[2] Economic theory suggests that firms offering higher non-wage-related compensation will offer lower monetary compensation, all else equal. See, for example, reference [2]. An alternative explanation is that firms may use the mix of monetary and nonmonetary compensation to attract certain types of workers.

work in the same geographic location may be highly undesirable and a source of significant dissatisfaction with military service. While the pay and benefits provided to these two people are identical, they are receiving very different levels of compensation.

Since the military's compensation system appears to have more nonfungible, nonmonetary components than other vocations, it is important to identify and understand people's tastes for these components, especially because individual taste is so subjective. We will return to the issue of improving the value (compensation) of service to members with a wide range of tastes in cases when a large portion of compensation is not pecuniary.

Why do policy-makers get it wrong?

It is very difficult, if not impossible, for policy-makers to independently assess individual preferences. This is *not* a problem that is unique to policy-makers; more generally, one person cannot determine the value that another person places on something without reliable data on which to base that determination. This problem is compounded, however, by the fact that the preferences of a policy-maker are probably very different from the preferences of the average Servicemember.

A common assumption is that today's youth have preferences and value systems different from those of older generations when they were young. With any generation there is a distribution of preferences, with variation around the average. However, we find little empirical support to believe there has been an overall change in the response to compensation. In fact, reference [3] finds that enlisted personnel in today's Navy respond to compensation in much the same way as their predecessors.

An alternative explanation (or, at least, a contributing factor) is that individual preferences and priorities change as people age. Reference [4] cites the literature supporting this explanation in its analysis of the military downsizing during the 1990s. A 20-year-old and a 50-year-old value many things differently. If older people had perfect recall, they might be surprised to discover that, on average,

their preferences and values during their youth closely resembled those of today's generation.

When it is difficult to tell *a priori* how another person will value something, we tend to assume that others value it the same way that we do.[3] In an era where military compensation had to be geared to careerists, this propensity was less problematic; careerists are closer to policy-makers in terms of their age, family status, and career objectives. When compensation policy has to be focused on younger cohorts, the disparity between what policy-makers and military personnel value has likely grown.

Greater need for competitive compensation

The need to better shape the military compensation package is more pressing now than in the past. More and more, military careers blend with civilian careers. Jobs that were once exclusively military in nature have been converted to civilian and contractor positions. People in these jobs often use the same skill sets as military personnel and perform the same functions. Military training and experience, and even having a security clearance, appear to have more value over time outside the military. Retired military personnel move directly into jobs in the defense industry, sometimes performing the identical job they performed while on active duty. A recent study by Mackin and Darling [5] finds that retired officers earn more than their counterparts in the private sector who did not retire from the military. Retired enlistees earned salaries similar to comparable civilians who did not retire. In both cases, retired income and healthcare benefits are not included in the retirees' compensation. Both findings suggest that the training and experience in the military is transferable to the civilian sector.

Other trends contribute to a blending of military and nonmilitary occupations. Retired officers can now work in the civil service without forgoing their retirement pay. Active and reserve roles now

[3] This is known as the *false consensus effect*. People have a tendency to overestimate the similarity of their views with those of the general population.

overlap significantly; changes in one component's compensation directly affect the labor supply to the other component.

In summary, the cost of leaving the military has dropped considerably since it is much easier to find a job that uses and rewards the military training acquired while on active duty. This places a greater burden on policy-makers to ensure that the compensation package offered to Servicemembers is competitive with that offered by other employers. The consequences of ignoring these changes are that recruiting and retention will suffer, as the value of military service falls relative to other employment opportunities.

Strategic goals of compensation

Before we discuss how well the military compensation system has performed, we need to identify the goals that policy-makers are trying to achieve. Researchers have identified three objectives for military compensation.[4] First, compensation needs to be able to attract and retain the right people. This goal is the one that most people consider when evaluating the compensation system. Levels should be set, not only to hire and retain the aggregate number of required workers, but with an appropriate level of variation so that people with different skills and qualifications can fill a variety of different positions.

The other two goals are equally important but are not always explicitly considered when assessing the military compensation system. A compensation system needs to be able to allocate workers to different assignments. An optimal system would be able to fill the so-called hard-to-fill assignments and provide incentives for people to do what the Services need to have done. In addition, compensation should reward performance. That is, personnel should not feel that pay (or promotion, which is closely aligned with pay) is unrelated to performance and productivity. If they appear unrelated, the

[4] The literature contains several different characterizations of these objectives, with different emphases and relative importance of different objectives. Our discussion here most closely follows [6]. For a slightly different treatment, see [7].

Services discourage improvements in performance. DoD should tailor compensation to encourage Servicemembers to give their best effort in performing their tasks.

Policy-makers usually concentrate on minimizing the cost of meeting these goals. Something we have alluded to, however, is that the direct budgetary cost to the government is not always the appropriate metric in assessing the efficacy of a compensation system.[5] Some costs to the government are indirect. Consider the consequences of requiring personnel to accept undesirable assignments. If forcing people into undesirable assignments reduces retention of groups subject to those assignments, or if it reduces the performance of people in those jobs, the costs are diffuse and not readily quantifiable. In other cases, the value of compensation to the Servicemember can exceed or fall short of the direct financial cost to the government. In the following sections, we discuss the extent to which the military compensation system furthers these goals, and we identify areas in which improvements could be made.

[5] This is similar to the issue raised 30 years ago that the All Volunteer Force was too expensive. It was only expensive if one focused on compensation in the budget. The opportunity cost to society was clearly the relevant cost to examine.

Meeting manpower objectives

Getting the aggregate numbers right

Given the current compensation system, the military has two principal means of reaching the total personnel requirements: adjusting the number of new recruits and adjusting the number making a first-term reenlistment. In most years, the Services recruit and retain enough people to reach their endstrength. In recent months, the Army has missed some recruiting goals, but all the Services are hitting their reenlistment goals and the active force is close in numbers to the original target. What attracts these people to the military and what motivates them to stay? What do these young men and women value?

While several components of military compensation influence enlistment and retention decisions, we focus on two of the larger benefits offered to Servicemembers: initial skills training and retirement benefits. Several other aspects of compensation, including shipboard berthing requirements in the Navy, military housing, quality-of-life programs, and even working within versus outside one's skill, all have value to individual Servicemembers and should not be forgotten when assessing the alignment of compensation with the Services' strategic goals.

Training as compensation

Potential recruits consistently mention training as one of the most attractive components of the military compensation package. In the Youth Attitude Tracking Study survey, about one-third of civilian youth who report that they are "definitely" or "probably" joining the military cite training benefits as one of the main reasons they are considering enlistment [8]; one-third also cite education benefits as

a main reason to serve.[6] Those who actually enlist report similar motives. As an example, [10] reports that Marine Corps recruits considered educational benefits and training "extremely important" factors in their decision to enlist.

The military, with its closed-loop manpower system, does a lot of training of young people and pays them while in training. It makes the military attractive to youth in general, and it makes the military even more attractive to certain youth. As with other benefits, training is valued differently by different people. That is, whether intended or not, the training is a targeted benefit, making military service somewhat more attractive to some people than to others. In this case, military service is more attractive to those who desire additional training—perhaps those with high school degrees (they have already shown some proclivity to persist to completion of training) or those with higher AFQTs (their scores suggest they have the greater capabilities to get value out of training). Some who question a strong link between compensation and military service often cite training as a "non-compensation" reward that attracts people. Yet, training is a substantial part of the compensation package, both in value to recruits and in cost to the military.

Of those already attracted to patriotic service, policy-makers have added value (compensation) to those also interested in training. The military compensation system doesn't force Servicemembers to choose between patriotism and training. The military is the one place where people can get both.

There is nothing about the military mission, however, that requires enlisting untrained recruits who possess the motivation to be trained. Rather, the structure of the compensation system causes this form of selection. The Services could recruit from the pool of pretrained personnel instead, but the compensation system is not targeted to these people.

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[6] We distinguish between *training* and *education*. Here, we focus on training—that is, skills directly applicable to the job. In contrast, education benefits, which provide more general skills, are traditionally viewed as discouraging reenlistments. However, see [9] for evidence that those who use education benefits actually have higher reenlistments.

In this respect, the training component of the compensation package is *one-dimensional:* it is attractive to some but not to others. For those interested in acquiring skills, the military training benefit is well aligned with recruiting since it is directly targeted to the population it is intended to attract. Making this part of the compensation package *multi-dimensional,* so that it appeals to a broader cross-section of potential recruits, would enhance the value of this part of the compensation package.

Existing programs consistent with this concept are the Student Loan Repayment Program (SLRP) and partnerships with colleges to award credit to students for military training, coursework, and occupational specialty. The SLRP helps attract people with some college coursework who are interested in military service. In other words, this program is a benefit targeted to a different segment of the population than the traditional pool of recent high school graduates. Similarly, partnering with educational institutions to provide college credit for military service provides additional options to potential recruits. They are not forced to choose between higher education and military service; these partnerships allow people to both serve *and* acquire additional education.

Training and labor contracts

Training has value because it increases future wages and benefits. But the military also offers current compensation during the training. In fact, pay and allowances (known as Regular Military Compensation, when adjusted for tax advantage) is greater than civilian earnings of high school graduates with the same limited experience [11]. So, the military is offering training that is more easily transferable than it was in the past and providing apparently competitive current compensation during the training. The military is able to offer more training than the private sector because it can contract for future service. These contracts are, at best, weakly enforceable but are supported in both law and practice. There are many examples of labor contracts in the private sector, but many industries find it difficult to enforce these contracts. Without a contract, investments in general training can be lost unless trained people are paid competitive wages. If training is less specific to the military than it used to be, the value to the individual Servicemember is greater and

the need for having a contract is greater. Requiring Servicemembers to sign a contract allows the military to protect its investment in training [12].

There is downside of having contracts. The contracts, on their own, directly affect the value of the compensation package. All active-duty enlisted personnel have a contract to serve for a defined period. When officers are commissioned, they also sign a contract. For young people considering military service, it is likely that contracts discourage some enlistments. Three to six years can seem like a long time, especially for a teenager who is not certain whether military service is the right career choice. In addition, research shows that the bulk of increases in earnings for young workers come from switching jobs [13]. Although unintended by the Services, requiring people to sign contracts precludes their following a path that could provide more wage growth in the early years. Yet many do sign such contracts and, in most years, the Services have enough recruits signing contracts to meet requirements.

Holding all else constant, the people who choose to serve are those for whom the value of service exceeds the penalty imposed by the contract. The literature does seem to suggest that longer contracts are equivalent to reducing pay. In one sense, people with long contracts lose the "option value" of changing jobs. Reference [14], for example, concludes that for Air Force personnel a $1,000 increase in enlistment bonuses for 6-year enlistment contracts reduces the number who sign 4-year enlistment contracts by about 9 percent. In other words, more people sign longer contracts if they are compensated for forgoing the option of leaving. Reference [15] concludes that this tradeoff exists at the first reenlistment point as well, estimating that 6-year reenlistment contracts require 6 percent more pay to make them equal in value to 3-year contracts.

As with training, people differ on how they feel about contracts. By requiring a contract, the military creates a difference in the value of service between those who find contracts only a little distasteful and those who find them very distasteful. So, of those lured by patriotic service and most attracted by training, those least averse to contracts are those most likely to join the military. It discourages those with the least interest in the military from signing up. However, people who take high risks and may have to put their lives on the line could

also be the same people who are averse to the commitment implied by a contract.[7] Should the Services offer shorter contracts for new recruits? Here, are some points to consider:

- Shorter contracts should attract more recruits, although the elasticity with respect to contract length is unknown.
- Although it should attract more recruits, some (possibly many) who sign shorter contracts would have signed longer contracts had the shorter contracts not been available.
- Those who sign shorter contracts are likely to have lower retention beyond the original, longer contract period for two reasons: (1) some of the additional accessions are less interested in service than those who agreed to longer contracts, and (2) some who switched from the longer contracts would have stayed for the longer enlistment but are no longer required to do so.
- Lower retention means that a smaller percentage of time is spent in a duty billet and a larger percentage of time is spent in training.

For those who reenlist, contracts could actually be an *attractive* part of the compensation package. If a person has decided to serve for a full military career, a longer contract increases the probability that he or she will be able to do so. In other words, a contract provides stability and job security for those who are certain that they wish to remain as employees. This implies that, as people progress throughout their careers to the point at which they can be considered "careerists," they would be willing to sacrifice some pay for the guarantee of employment implied by a contract.

These thoughts lead us to the possibility that the Services offer a menu of contract lengths. The contract lengths offered for an

[7] An alternative view would be that the willingness to take these two types of "risks" are unrelated. That is, some young people might both be committed to serving in a job that puts them at physical risk and value a long-term contract that increases the likelihood that they would be allowed to continue to take these risks in the future. We are not aware of any empirical evidence for or against this proposition.

occupation would be based on the cost of training, appreciation of skills on the job, the elasticity of recruits to contract length, and the cost of getting people to reenlist. These, of course, are all empirical issues. We only note that contracts and contract lengths have different values to different people, and those values could change over a career.

Retirement and retired healthcare

Where training has great value for the youngest Servicemembers, retirement and retired healthcare have the greatest value for more senior service members. The military retirement package is a very controversial part of the compensation for our Servicemembers. Whether one endorses the current retired benefits or criticizes them, several facts are fairly well accepted:

- For those who reach around 10 years of service, retirement benefits are the reason most stay until 20 years of service. Very few choose to leave as they approach retirement eligibility, and most remain with the expectation of entitlement to full retirement benefits [16].

- The Services accommodate these expectations and are reluctant to involuntarily separate senior personnel before 20 years of service. This relationship has been described as an *implicit contract* between the military and its Servicemembers [17]. It is believed that violating this implicit contract would affect the ability of the Services to recruit and retain the people it wants to remain on active duty.

- These benefits are also the reason many enlisted personnel leave within a year of reaching 20 years. After 20 years, one is earning only marginal increases in retirement benefits and no additional healthcare benefits.

- The behavior induced by the structure of these benefits limits to two the number of pressure points available to alter the flow of people: the beginning of a military career and the expiration of the initial enlistment obligation.

- These benefits have a very small impact on attracting new recruits, at least as reported by the youth themselves. Only about 4 percent of youth in the Youth Attitude Tracking Study (YATS) survey include retirement in their list of reasons they would strongly consider enlistment.

These survey results probably come as a surprise to both policymakers and to economists. On one hand, we imagine that many economists would be surprised that the percentage of recruits who value retirement is not zero. On the other hand, many policymakers would be surprised that it is that low since military retirement is considered by many of them to be an extremely desirable benefit, especially when compared with comparable programs in the private sector.

The value of retirement benefits

The retirement benefit is relatively unimportant to recruits for two reasons. First, it is a deferred benefit; Servicemembers do not receive any of the benefits until at least 20 years in the future. Second, recruits are not certain that they will ever actually receive the benefit; it is conditional on serving at least 20 years.

While the actual value of retirement to a new recruit depends on a number of factors, a stylized example serves as a useful illustration.[8] Consider a new recruit who expects to reach the E-6 paygrade if he serves at least 20 years. If he were to retire at this paygrade at 20 years of service, he would receive about $1.6 million in after-tax pension benefits over his lifetime.[9] For a new recruit with a 10-percent discount rate, this future benefit is only worth $41,000

[8] We present an example for enlisted personnel. The data for commissioned officers lead to the same qualitative conclusion as for enlisted personnel.

[9] The after-tax amount is the net cost to the government. A number of additional assumptions are needed to place a value on retirement benefits. We follow [18] and adopt the same assumptions about life expectancy (79 years), growth in military pay (3.5 percent per year), inflation (3.5 percent per year), and tax rates (15 percent for enlisted personnel; 28 percent for officers).

today *if* he expects to reach 20 years as an E-6 with 100 percent certainty.

That value is an overestimate, however, if the recruit truly does not know whether he or she will seek (or be allowed) to stay to 20 years. If we consider recent retention, only 15 percent of new enlisted recruits will actually reach 20 years of service. If the new recruit figures that he or she will seek or be allowed to stay to 20 years with a 15-percent probability, retirement is worth only $6,100 to a new recruit with a 10-percent discount rate; it would be worth only $500 to a new recruit with a 20-percent discount rate. Compare these estimates with the contemporaneous cost to the government: DoD sets aside $4,000 of a new recruit's salary in the first year **alone** for the future retirement benefit.[10]

In contrast with these numbers, policy-makers seem to view military retirement as an extremely valuable component of compensation. We say that because any efforts to substantively change the retirement system are met with significant resistance. There are three possible explanations as to why deferred compensation continues to play a predominant, disproportionate role in the compensation package.

First, it is possible that policy-makers simply overestimate the importance of retirement to Servicemembers. Second, it could reflect a desire to "take care of" the Servicemember, even if it is not something that today's recruit appreciates or desires. Third, the population that has retired and is already enjoying the sizable pension benefit could be made up of vocal supporters of the current system and represent themselves (for some issues with good justification) as speaking for potential new recruits and the entire force. While it is likely that each of these explanations plays some role, we discuss each one separately.

Overestimates of the value to Servicemembers of retirement benefits could be due, in part, to the fact that policy-makers are much closer to retirement age. For them, retirement is less deferred; it is a tangible concept. Also, there is less uncertainty as to whether they

[10] For any recruit with a discount rate exceeding 11.5 percent, the DoD set-aside exceeds the value of retirement.

will receive pension benefits. Cliff-vesting at 20 years in the future is a concept foreign to the experiences of most policy-makers.

Consider what the military retirement package would be worth to policy-makers if it were offered to them. Assuming the same discount rates and life expectancy as we did for Servicemembers, the enlisted military pension would be worth $223,000 to 50-year-old policy-makers if it were offered to them today.[11] In fact, it is likely that the value to policy-makers is even greater because the empirical evidence suggests that older people have significantly lower discount rates.[12]

We are not suggesting that policy-makers explicitly assume that Servicemembers have the same preferences and priorities as they do. Rather, we expect that, when policy-makers consider the military retirement benefit, they instinctively believe its value is measured in the hundreds of thousands of dollars since it would be worth that much to them. The realization that it is probably worth only a few hundred, or maybe a few thousand, dollars to Servicemembers is something that few probably truly believe.

Furthermore, those who believe that Servicemembers do not value retirement could feel that this is an "inappropriate valuation," not a rational economic response to intertemporal incentives. This leads us to the second possible explanation—that policy-makers are trying to do what is best for the Servicemember, even if it is not currently appreciated. This is consistent with the view that the military should take care of its Servicemembers in a way that recognizes their sacrifices and minimizes their hardships. There are surely some policy-makers who believe that they are doing "the right thing" by providing a benefit that Servicemembers don't highly value but can rely on when they leave service. While some junior personnel may bristle at the connotation that leadership knows what is best for them (and knows better than they know themselves), others may appreciate

[11] The military pension of a commissioned officer would be worth almost twice this amount to the policy-maker.

[12] Reference [4] provides evidence of this relationship for military personnel. For an excellent summary of the broader literature on discount rates, see [19].

that policy-makers are looking out for their best interests. The data suggest, however, that Servicemembers do not appreciate such attention 20 years in advance.

Finally, personnel currently receiving pension benefits are strong advocates of the current system. This is a rational response; they are no longer getting credit toward deferred compensation but are receiving the pay right now. Retirement benefits will always be more valuable to those who are receiving them than to those who think they might receive them at some point in the distant future. There is also a selectivity factor here: those who most valued the traditional compensation package (with retirement) were more likely to make the military a career. This suggests that any attempts to reform the retirement system must protect the value of pension benefits for those who are receiving them. Otherwise, the military would be (correctly) perceived as reducing compensation for those who have served their country, and rewarding those who have not yet begun to serve.

The retirement system and filling the billets

The cliff-vested nature of the retirement system directly affects the ability of the Services to meet its true requirements. Average experience levels indicate that people who remain in the Navy until the 12th year of service will remain until vested in the retirement system. When they reach 20 years, however, many do immediately leave the Service. Consequently, the experience profiles of both enlisted personnel and commissioned officers are largely driven by the retention behavior of Servicemembers and are not necessarily the "optimal" profiles that the Services would choose in the absence of any constraints [17].

It would be entirely coincidental if the experience profiles generated by the cliff-vested retirement system aligned with the real needs of the Services. Several researchers have argued for greater flexibility in shaping these experience profiles, particularly by occupation. For some skills, there is a premium placed on "youth and vigor," and a relatively junior experience profile is desired. For other skills, there is a premium related to seasoning and experience, and a relatively senior experience mix is desired. The empirical literature is clear that differences in career lengths by occupation would be

cost-effective, for both enlisted personnel and commissioned officers.[13]

Improving the value of retirement to Servicemembers

One of the central reasons that the value of retirement is so low to junior personnel is that it is worthless unless they serve 20 years.[14] Recent retention rates suggest that the probability of a new recruit serving 20 years is relatively small; we estimate that, for many people, their expectation of serving 20 years is even smaller. And for those who have no intention of a 20-year military career, the retirement benefit has no value. Two changes to retirement would increase its value to Servicemembers and improve its efficacy in influencing enlistment and retention.

A relatively modest change would be to shorten the amount of time before personnel are vested in military retirement. The value of retirement would increase since receipt of benefits would not be as distant a point in the future. In addition, more Servicemembers would place a non-zero value on the benefit since a shorter required career length would make it accessible to more people. The current legislation concerning Voluntary Separation Pay is a good example of a change to the system that would raise the value of retirement to Servicemembers [16].

Second, a radical transformation of the retirement system would allow the pension to be completely "portable." Personnel could leave military service, enter the private sector, and continue to accumulate benefits. This form of retirement pension is common in the private sector and has proved to be relatively popular among civilian workers [22]. The military has placed itself at a competitive disadvantage in the battle for talent by continuing to offer a benefit that

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13 For an empirical analysis of the costs and benefits of higher seniority of enlisted personnel, see [20]. Reference [21] makes a similar case for officers.

14 Some do join the Reserves or at least consider that to be an option. For these people, the retirement benefit has some value, although it is still relatively small.

is inferior in this dimension, especially as portability of retirement benefits increases in the civilian sector.

Note that neither of these proposed reforms provides a mechanism for policy-makers to *increase* career lengths in those occupations for which it would be cost-effective. Furthermore, as we noted earlier, resistance to reform is significant and built around several beliefs that are not easily changed. Our conclusion, however, is that changes to the system are *mandatory* if the Services wish to significantly improve the alignment of the military compensation system with their strategic goals.[15]

Allocating personnel and Servicemember choice

When discussing the second strategic goal of compensation, the need to fill different billets, one must address the role of Servicemember choice. An optimal compensation system would provide incentives for people to voluntarily choose to do what the Services desire. The issue is whether we could allow Servicemembers to pick individual assignments. To what extent can we allow Servicemembers to choose assignments? How does that fit with the military's need to direct many of the actions of Servicemembers?

The military as an institution has to have a very clear structure and clear sense of the meaning of an "order." Servicemembers volunteer to give up choice in a way that is foreign to those of us in the civilian world. No one challenges that principle, yet that choice-limiting culture has crept into areas where individual preferences could be taken into account. That is, there are certain decisions where members may value having a choice and where the military has no reason related to its mission to deny choice.

As we've noted earlier, opportunities for Servicemembers in the civilian sector has grown. Those same Servicemembers differ in how much they value the components of military service. For example, they vary in how much they value an assignment in a given location

[15] Reference [7] provides compelling recommendations for retirement reform.

or even moving in general. If we could accommodate those preferences, and still meet the needs of the military, we would in a very real sense be increasing the compensation of our Servicemembers. In this section, we focus on two general areas where the Services have ample opportunity to allow for individual preferences: (1) acceptance of assignments and rotation policies and (2) implementation of the Continuum of Service.

Assignments, rotation, and relocation

Although the Services tend to fill most billets, they also tend to always be short in some areas. The military has a standard practice to move people through assignments. So, the number of empty billets is partly determined by how many are vacated every year through rotation. We'll discuss the value of this rotation from the military's point of view later, but for now we will consider the value to the Servicemember of these rotations.

There is good reason to believe that rotation has a negative value to many personnel and that it reduces the overall military compensation package to them. In the career force, most are married, and many of the spouses work or seek to work. Most of this analysis looks at wives of military personnel. Military wives have increased their labor force participation over the past 40 years; it has more than doubled—a change that mirrors the trend for civilians [23]. However, military spouses are less likely than their civilian counterparts to be employed full-time, and, for those who are fully employed, earnings are lower than for civilian spouses [23, 24 and 25]. Reference [26] notes that lower wages are not just from disrupting the spouse's work, but also because of the spouses moving into crowded labor markets with other migrating workers like themselves. Reference [25] concludes that a good portion of this differential can be traced to the Services' rotation policies. Specifically, the authors conclude that less frequent rotations for Servicemembers would significantly raise earnings of their spouses. [16]

[16] A study on unemployment compensation [27] notes that many states would not provide unemployment benefits to spouses who move and leave their jobs because of rotation.

Other trends contribute to rotation's negative impact on household income. More women are in uniform and their spouses may have invested more in their current jobs. Recent work suggests that the earnings penalty is equally true for husbands following military wives; these spouses' earnings are 25 percent less than earnings of comparable men whose wives work in the private sector [28]. Furthermore, more military personnel are married to other military personnel, and that makes it difficult for both to get the best career assignment at the same location.[17]

Eventually, a Service's rotation policy makes it likely that a Servicemember will be asked to move on to a different assignment at a different location. The implication is clear. The Service *is* providing a choice. However, it is asking the Servicemember to choose between his or her own career and the career of his or her spouse. To some extent, this is true in the private sector; in the military, it is routine. When labor force participation of spouses was low, this choice did not involve the same degree of tradeoffs that it does today. Reducing rotations and the frequency of relocation would significantly increase the value of military service to many members. In this context, extra incentives for relocating to and serving in economically undesirable locations could be seen as simply returning the value of the assignment to the ones they are leaving.

In addition, specific jobs and locations themselves can add to or subtract from compensation. The Services recognize that different jobs and locations have different values. A spouse's job is just one of many issues affecting tastes for a location and stability. Children's schools, special health needs of dependents, and recreational interests all play a part. It is not uncommon for people to be offered "higher valued" locations and assignments as a reward for reenlisting. In the Navy, this could mean going ashore instead of serving at sea. That is, the Navy moves the person out of a sea duty billet and risks gapping it today with the hope that it will increase the

[17] There may be another negative impact of frequent rotations; this would be on the education of children. There is some evidence that frequent changes in children's schools adversely affects their academic performance. It is unclear how this carries over to military rotation, but it does suggest another way where frequent rotations can diminish the value a Servicemember places on military service.

likelihood of meeting this need in the future. For some officers, the lure to staying in the military could be acceptance in an education program. The important point here is that the military has long recognized and taken advantage of the fact that not all billets are equal.

If the military is willing to keep people with promises as to their next assignment, it is not a big step to allow Servicemembers to propose the remuneration they would want in order to accept certain assignments. The Navy's use of Assignment Incentive Pay (AIP) has shown early promise and is an innovative example of a Service allowing its members to express their preferences and be compensated for them.[18]

Continuum of Service

Men and women who wish to serve in the military must choose between active (full-time) and reserve (part-time) duty. Characterizing Servicemembers as either "active" or "reserve" has been done for a number of years, but it is not consistent with the way the Services are currently using personnel. More and more reservists are consistently and significantly exceeding the traditional, 38-day service requirement of reservists. In many cases, these part-time reservists are shifted to active-duty status as the Services desire, and many reservists have been mobilized in support of the Global War on Terror.

Some have noted the inherent difficulty in moving from part- to full-time status; others note the flavor of "conscription" implied by the use of mobilization as a force management tool. Some policymakers have proposed replacing the existing model of participation with a new paradigm, the "Continuum of Service."[19] This continuum seeks to blur the lines between active and reserve duty so that it is relatively easy to move from one status to the next. Furthermore, the continuum would allow different degrees of part-time

[18] For a description of the AIP program and the early efficacy of this system, see [29].

[19] Reference [30] provides an excellent description of the Continuum of Service.

affiliation, with variation around the traditional, 38-day requirement that is more consistent with how reservists are currently being used.

At the heart of the Continuum of Service is the recognition that people differ in their willingness and ability to accept activation and deployment. To the extent that more people are willing to volunteer for higher levels of participation, forcing service through involuntary mobilization could be reduced, if not eliminated. It recognizes that not all reservists are identical; rather, they have different preferences, employment opportunities, and career objectives. For example, students, the self-employed, part-time workers in the private sector, and those currently unemployed all have situations that are different from a reservist working full-time for a civilian employer. On the supply side, then, the Continuum of Service provides different opportunities to volunteer for different people. It even allows the same person to volunteer for different levels of affiliation at different points in his or her career.

The existing compensation system, however, is not designed for this new level of reservist participation.[20] Significant changes to compensation would have to occur in order to provide sufficient incentives for different people to voluntarily accept different levels of participation. Our sense is that existing and planned research represents an important first step in determining the level and structure of compensation necessary for varying levels of affiliation. The benefits, though, are clear because they provide people with choice and an opportunity to serve in a way that is best suited to their civilian career and family constraints.

[20] While the Continuum of Service also affects active-duty Servicemembers, the most notable change for active-duty service would be the ability to easily move between full- and part-time status. In contrast, reserve service would be dramatically altered. Consequently, we focus on changes in compensation that would be needed to support different levels of reservist participation.

Providing incentives for performance

Finally, the compensation system should not discourage, but instead encourage, good performance. A related goal is that the compensation system be set up to retain the best performers. We would expect that, holding all else constant, people with the most favorable civilian earnings opportunities are the most likely to separate from service at the expiration of their initial obligation. The inferences that many draw are that (1) the highest quality personnel are those with the most favorable civilian opportunities and, therefore, (2) the highest quality personnel are those most likely to separate at the reenlistment point.

A cursory examination of Navy data is mixed on the issue of who leaves. Let us start with Armed Forces Qualification Test (AFQT) scores. Those with high AFQT scores are more likely to make it through bootcamp and complete initial obligations. But do they continue on with their careers? Figure 1 provides some empirical evidence. Following three accession cohorts over time, average scores on the AFQT rise through the first years of service in the Navy.[21] A person's score does not change over time. Therefore, we attribute this to higher first-term attrition of people with lower AFQT scores and shorter enlistment obligations for those with low scores.

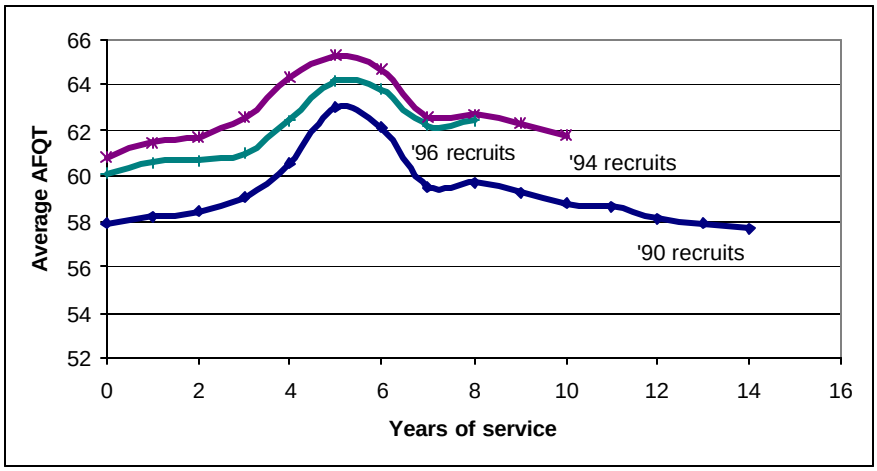
After the sixth year of service, however, average scores monotonically decline as years of service increase. This decline is due to lower reenlistment of people who performed better on the test.[22] After 15

[21] AFQT scores and attainment of a high school diploma are two common measures on which policy-makers and analysts focus when trying to characterize the "quality" of an individual. The results we present are similar for all recent accession cohorts and are not sensitive to the way in which AFQT scores and high school diploma attainment are used to characterize quality.

[22] In the Marine Corps, high-quality people are more likely to reenlist at the end of the first term [31].

years of service, average scores of the remaining cohort are virtually identical to that of the cohort of the time of accession.[23]

Figure 1: Average AFQT for enlisted entering Navy 1990, 1994, and 1996



AFQT scores and educational attainment have proved to be reliable proxies for quality when predicting whether a new recruit will attrite during the first term of service. However, the Services learn more about the quality of personnel while they serve, and this information is a more reliable indicator of quality. Analysts and policy-makers have long recognized promotion, and the speed of promotion, as indicators of Servicemember quality. For example, the Navy was explicitly using both promotion and the speed of promotion as tools to sort reenlistment requests in overmanned occupations in the early 1990s [32]. The military promotion system is designed to identify and reward top performers; these people are provided with a permanent increase in salary and a higher rank. At some points in the system, promotion to a given rank is a mandatory condition of continued service. Most consider the promotion system to be effective at identifying Servicemember quality; therefore, a person's promotion history will reflect the quality of his or her performance.

[23] This does not account for enlisted who became officers and warrants. That tends to be a small group, but it is probably a group with higher AFQTs.

While many enlisted promotions are vacancy driven, [33] demonstrates that, even within ratings and year-groups of personnel, there is considerable variation in the speed of promotion to a given rank. Since promotion is an indicator of quality, those who promote more quickly are considered to be higher quality. In analyzing the Navy's use of promotion as a screening tool, [26] concludes that "using relative advancement success as the primary criterion for prioritization" will help select "the best sailors for higher reenlistment priority."

Reference [34], a more recent study, constructs a metric that incorporates speed of promotion into a measure of quality. Using these data, the authors demonstrate that the Services *are* able to retain the highest quality people. How does one reconcile this with traditional interpretations of reenlistment models? These models predict that, *holding all else constant*, those with the most favorable civilian earnings opportunities are most likely to leave. When comparing high- and low-quality Servicemembers, however, all else is not held constant: people who are promoted are rewarded with increases in military compensation. We conclude from the results in [34] that the rewards of promotion are sufficient to offset the deleterious pull of higher salaries in the private sector.[24]

Although the Services appear to be providing incentives for high quality, there is room for improvement. Walter Oi recently noted that the Services' use of bonuses is unique [35]. Private-sector firms use bonuses for existing employees to *reward* performance that has *already occurred*. Bonuses act as an incentive to increase performance since higher productivity increases the likelihood of being rewarded with a bonus.

The Services use bonuses to institute variance in compensation by occupation; any effect of bonuses on performance is unintended and coincidental.[25] If the Services can better align compensation

[24] These rewards consist of both the increase in compensation due to promotion and the value to the individual of a higher "status" in the organization.

[25] As Oi notes in [35], a reenlistment bonus "is a payment to persuade a soldier to be present; it does not reward an individual for a job well done."

with productivity, they will provide greater incentives to effectively carry out the military mission. A minor change would be to tie anniversary payments of bonuses to the rank a person holds at the time an installment is due; currently, bonuses are tied to rank at the time of the reenlistment decision. Alternatively, reenlistment bonuses could be targeted to high-quality Servicemembers, not just the occupation in which a person happens to be employed.

A more ambitious reform would be to institute an explicit pay-for-performance system. Promotions occur relatively infrequently and are finite in number (i.e., a person cannot be promoted beyond the highest rank). More frequent remuneration for performance would increase the incentive to perform. This strategy requires that performance be clearly and objectively quantified and measured; this is not a trivial task. However, the benefits of aligning compensation with the military mission are large enough to warrant consideration of this approach.

Setting manpower objectives

Military manpower economists tend to focus on supply issues. More specifically, we focus on what it takes to attract and keep people. For purposes of examining supply, we have taken the statement of demands as given. Much of what we would consider "requirements" analysis has become the province of operations researchers, industrial psychologists, or management consultants. Economists, however, should also question those demands or at least ask if those demands were arrived at with full visibility into the costs and with full understanding of the tradeoffs.

For an uninitiated economist, it is difficult to discuss the demand side because military leaders will address their needs as "requirements" with little flexibility. The only tradeoff that some in the military will discuss is that fewer people means an increased risk of losing a battle and losing lives. This makes for a difficult discussion.

Those of us who are not experts in military operations need to accept that there are warfare requirements, even if such terminology is anathema to our way of thinking. Those requirements have many dimensions, including firepower, mobility, and sustainability. But there are a lot of assumptions made to get from a stated firepower requirement to a requirement for, as an example, an E6 dental technician. It is relaxing those intermediate assumptions that allows us to go from a fixed manpower requirement to a range of manpower and equipment alternatives that meet the original warfare requirement.

Before reviewing some issues on the demand side, we should consider whether there is any reason to believe that the current manpower requirements don't result in the right number and mix of people to do a job. Some very strong evidence comes from an unlikely source: public-private competitions. These competitions apply only to support activities in the United States, but such jobs cover a large number of those in the military. The competitions have produced considerable savings over time. For this paper, the

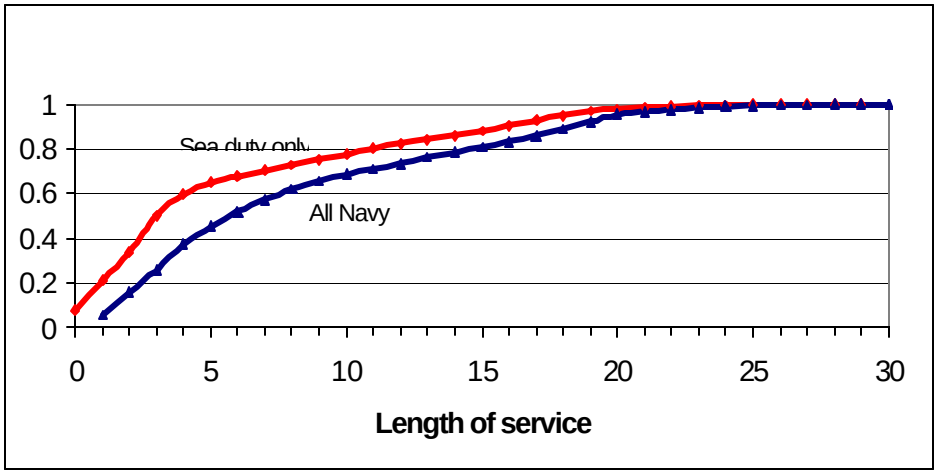
difference in savings from competing work done by military personnel relative to competing work done by civil servants is important. The studies show that savings are far greater when competing work done by military personnel. The additional savings are between 12 and 20 percent [36, 37]. That is, when we control for the inefficiencies associated with being in a public, nonprofit, noncompetitive environment, we still find that the way we use military personnel is suboptimal. The research also shows that the savings are usually in using fewer people, not lower compensation. So there is reason to believe that the process that sets the original requirements seems to result in more people (and possibly the wrong mix) doing the job. There are probably many reasons for these inefficiencies. We will discuss three: limited experience, rotation, and cost visibility. We will then discuss other demand issues that constrain our use of people.

Experience profile

The military tends to have a young force. A young force means one that takes risks, is in good physical condition, and has stamina. It also means inexperience and impatience in making decisions.

We frequently look at what is termed length of service (LOS) or years of service (YOS) to measure experience. Figure 2 shows the cumulative LOS profile for Navy enlistees. Fifty percent of these Sailors have fewer than 6 years of experience, and nearly 70 percent have fewer than 10 years' experience. In addition to the total force being young, the Navy's assignment policy has a far younger force in its operational billets. Fifty percent of those in sea billets have 3 or fewer years in service, and 70 percent have 7 or fewer years. Even those numbers overstate the experience in the Navy because the Sailors are in school for the first 6 to 9 months. So, 3 years is actually closer to between 2.25 and 2.5 years of experience.

Figure 2: Cumulative LOS of those in Navy and in sea billets



What is the "required" experience profile?

One can argue that the nature of military occupations drives the current experience mix. To some extent this may be true, but it is also clear that each Service has a culture that drives its own experience profiles that frequently differs from those in other Services. Reference [38], for example, reports that electrical and mechanical equipment repairers in the Marines have an experience profile more similar to infantry in the Marines than to electrical and mechanical equipment repairers in the Navy or Air Force. So, it may not be the skill that drives the experience mix.

One could argue that Marines in all occupations have to operate in a different milieu and with different demands. But the one occupation listed under Marines that differs from the rest of the Marine Corps is healthcare specialists. These people are actually trained by the Navy and are probably Sailors assigned to the Marines. The experience profile of those classified as Marine healthcare specialists looks much more like Navy electrical and mechanical equipment repairers than any occupation in the Marines.

Many studies find that experience is positively related to readiness (see, for example, [39, 40, and 41]). One needn't argue that this is a monotonic relationship. One need only note that the current overall median translates to between 22 and 25 years of age. We

think it is possible to make a reasonable extension of these relationships to Servicemembers in their late twenties or early thirties.

A recent study looked at support ships that went from military crews to civilian crews under the Military Sealift Command (MSC) [42]. These civilian crews were less than half the size of the military crews they replaced. What do they do differently? MSC civilian crews are more experienced than USN military crews. Close to 25 percent of the MSC civilians stay at least 10 years with MSC, but only 11 percent of enlisted personnel stay 10 or more years in the Navy. The authors found no evidence that smaller, but more experienced, crews degraded performance. MSC ships spend more time—close to a third more—under way. The civilian-crewed replenishment ships transfer comparable quantities of cargo. Reference [42] also examined the material condition, injuries, collisions, fires, groundings, and oil spills. In all cases, MSC ships, with smaller crews, did as well as or better than the USN military-crewed ships.

Are we measuring and using experience properly?

How should we measure the "required" experience? Is LOS sufficient? We know that people with the same LOS can have very different experiences. Consider a finding from a study that looked at experience while addressing maintenance practices. Reference [43] examined the experience of F/A-18 maintainers. Table 1 comes from that report. It breaks down the experience of those doing F/A-18 maintenance in the Navy and Marine Corps. Overall, the Navy personnel had more months in service than the Marines. The average Sailor had 97 months in the Navy, compared with 85 months in the Marine Corps for the Marine. When the authors looked only at months repairing F/A-18s, they found the opposite: the Marines had more time than the Sailors repairing F/A-18s—38 months versus 32.9 months.[26] What that means is that we have to be somewhat careful in shaping the experience of the force around the LOS

[26] This was not true for E-8s and E-9s, which may reflect the fact that F/A-18s were introduced earlier in the Navy. The "closed-loop" system should eventually give the Marines higher relevant experience at all paygrades.

distribution. One must recognize that experience is also defined by our assignment system.

Table 1: Average length of service (LOS) and F/A-18 experience in months for Navy and Marine Corp F/A-18 maintainers

Grade	Navy LOS	Marine LOS	Navy F/A-18 experience	Marine F/A-18 experience
E-2	17.3	19.8	8.6	11.1
E-3	32.5	27.8	20.3	17.2
E-4	54.2	51.5	27.9	35.5
E-5	109.7	97.5	40.4	53.7
E-6	166.2	163.8	44.3	60.0
E-7	199.7	209.1	42.9	65.6
E-8	246.1	259.5	41.1	38.2
E-9	291.4	303.1	49.8	42.8
All grades	97.0	85	32.9	38.0

Note: Data are for all enlisted assigned to F/A-18 squadrons between January 1990 and December 1996.

Specific relevant experience is important and likely to be more important than the general military experience captured in length of service. Reference [41] finds that units with maintainers with the correct Navy Enlisted Classification (NEC) for a job and with previous experience repairing the same aircraft had fewer aircraft down than units with maintainers who didn't have the right NEC or previous experience. That finding controlled for differences in paygrade mix. What they found was that overall experience—in this case measured by paygrade—improved readiness, but the experience in maintaining the specific aircraft was much more important.

Reference [42] noted that MSC civilians not only had more years with the Navy but also had more operational experience. For

example, by their 20th year, MSC civilians have had more than twice as much time at sea as USN military personnel. Where time on ships declines in the Navy with experience, experienced civilians are as likely to be at sea as their junior shipmates.

To summarize, there is evidence that the stated "requirements" may be larger than what is needed to perform the mission or function. That could be related to the youth of the military force, and there is evidence to that effect. Furthermore, the military may not be getting the full value out of the experience it has.

Rotation

We noted in our discussion of supply that rotation could frequently diminish the compensation package offered by the military. On the requirements side, it is also reasonable to ask if the rotation has value for mission effectiveness. Rotation has its roots in moving Servicemembers from difficult, dangerous jobs that separate them from their families to jobs that have less danger and where they can be with their family. In times of conflict, it may also be necessary to rotate people so that fresh troops can relieve worn troops. To retain people and to maintain a military of a reasonable size, then, rotation would seem to be necessary.

Rotation has other values in socializing people. When personnel stay with a unit too long, they could identify more with the unit than with their military service. Units start developing their own approaches and culture. Even with rotation, for many years, the Navy dealt with having Pacific and Atlantic Sailors, and people frequently identified themselves that way. This could work well if the units operate separately, but it did create some problems when ships from both fleets had to work together in the Persian Gulf.

So, rotation does have value. But it also has its cost. Frequent rotation means high turnover, which has been found to reduce performance. Reference [44] reported turnover of over 40 percent a year on Navy ships throughout the 1980s. The author cites several previous studies, with both exercise and material readiness performance metrics, where higher turnover reduced performance. In performance during ASW exercises, [45] found that a 4-percent

increase in turnover in a quarter is equivalent to leaving unfilled 10 percent of the positions on a ship. In maintaining the material condition of a ship, studies showed that an increase of 4 percent in turnover per quarter is equivalent to gapping 2 to 9 percent of the positions.

Rotation could also affect the quality of leaders we produce. Frequent rotation has a way of separating decisions from outcomes. Some argue that it leads to very conservative actions. That is, when you don't really know the job very well, you can simply go by the book and no one can question your performance [38]. But one could also argue that it would increase risk taking because people frequently look dynamic by what they do, not by what they achieve. If outcomes are not immediately understood or evident, someone could have an apparently great tour—that is, take dramatic actions—but be long gone before we could fully judge the merits of the dramatic action.

Reference [42] has some findings that suggest that frequent rotation doesn't hurt experienced crews. The civilian MSC crews had tour lengths comparable to the military crews. Civilian crewmembers didn't rotate on preplanned schedules, but they did leave their ships, so their average time on board a ship was comparable to the tour lengths of the military crews. The difference was that personnel with similar experience replaced those leaving. As a result, there wasn't a continuing flow of new people arriving at their first unit. The arriving crewmembers quickly moved into performing their new jobs.

In conclusion, turnover is harmful to performance when there are inexperienced crews and a constant flow of newly trained personnel. Turnover may not be an issue when experienced people are replaced by other experienced people.

Training

Both the experience profile and rotation policy affect the amount of training the military has to do. As we noted earlier, training has value to Servicemembers, particularly new personnel. But how much do we need to provide and spend? What is the

"requirement"? Many focus on improving the course content and "validating" its value. Yet, some portion of training cost, sometimes a large portion of those costs, is driven more by personnel policies than by course content. That is, a young force with high turnover and rotation "requires" more training.

Consider the example of Navy pilots, one that is similar to long training pipelines in all the Services. The Navy has approximately 6,900 designated pilots. Given the career management, rotation policies, and billet structure, the Navy has to train 700 new pilots each year. The training cost is reported to be between $1.0 billion and $1.5 billion a year. We are not training that many pilots because of a shortage of people with these skills. There are between 2 and 3 pilots for every operationally deployable aircraft in the Navy inventory. It is the rotation and assignment policies, which may have value in other ways, that drive these training rates. The Navy pulls trained people out of billets, creating a requirement for someone to replace them. It has a huge cost—one that is seldom considered in making personnel decisions. In addition to the student billets, we are tying up instructor pilots and purchasing and maintaining training aircraft. This pipeline, along with rotation policies, also leads to large refresher squadrons for those going from a nonflying job back to a flying job.

Looking at the entire Navy, 17 percent of enlisted personnel and 18 percent of officers are not assigned to duty billets. Most are under instruction. For officers, these percentages are above those of the early 1980s. Some of this reflects real increases in skills needed to operate complex equipment, but career lengths and tour lengths also drive this requirement. The longer that trained people stay in the Navy and the more often they are using their training on the job, the less that training of new people is required. If we could return to the 1984 percentage in training, the Navy would have over 2,000 more officers in duty billets today.

Cost visibility

We use the term *cost visibility* here to characterize the information and incentives that force organizations and units have to internalize the cost to their Service of their individual manpower decisions. If it

costs the Service $100,000 to fill a billet, we want the decision that establishes the requirement and the recurring decisions on how to use the person filling the billet to incorporate these costs. So, when we discuss cost visibility, we mean more than posting the full costs on a website. That may actually have some benefit, but it doesn't make it a cost to those making decisions. For all those making a decision, the cost needs to be the resources they give up. In short, these must be real opportunity costs. The decision to create a billet or use it in a certain way may be the same with cost visibility, but the fact that the decision draws resources from other uses will be recognized (and felt) by those making the decision.

Setting military billet requirements is clearly an art that few of us understand. For units built around weapon systems and platforms, both numbers and experience/skill mix must be determined. The Services do consider the life-cycle manpower costs when deciding on new systems. The Services consider operability, reliability, and maintainability tradeoffs and how they affect future manpower costs. These tradeoffs appear to focus on number of people, and differential costs may not be put in for different skills and experiences required for different types of systems.[27] There is evidence that including people cost has had an impact. In the Navy, the number of people on ships has come down considerably. One major reason is a technical one—the introduction of gas turbines to replace steam boilers. So, at least in the front end, initial requirements include personnel costs in making platform decisions, and this seems to have controlled costs.

For ground troops, the number of people defines the units. The size is, by definition, fixed. The experience and skill mix must still be determined, however. We will mention several concerns about how requirements for the mix are determined.

Costs not in unit budgets

Once systems are in operation, units and commands do not have visibility into the compensation or full cost of military personnel.

[27] This may vary somewhat by Service. The Navy, for example, does consider rating, paygrade, and NEC in determining training requirements.

This means that, even when these organizations have a role in determining initial requirements, they do not have to consider the cost tradeoff. At the unit level, when they seek changes in requirements, they do not see the opportunity costs associated with those requirements. Units and commands are simply justifying a requirement in isolation. There is no cost to the units and commands for seeking additional billets. Once a weapon is fielded, the requirements process is set up in such a way that it signals to those at higher levels that there is a need for more people. The Services don't decide to buy all those people, but the signal they receive is that more should have been funded.

For shore activities, the lack of military personnel costs in budgets is of even greater concern because the alternative is often a civilian, whose pay is in the budget, or a contractor, whose total cost is in the budget.

The lack of military payroll in command budgets could also lead to the poor use of people once they are assigned to the commands. With little sense of the cost to the Service, commands are likely to underutilize personnel. People are assigned tasks to fill or more than fill their days, but there is no sense of whether the value of the work exceeds the cost. The local command sees the value; at best, headquarters sees the cost.

Opportunity cost can be made visible even without introducing costs in a command's budget. We can introduce asset visibility, which brings in a different type of opportunity cost. Many personnel are carried in Service-wide accounts and are not carried as being assigned to a unit. In the Navy, enlisted who are in the initial training pipeline and attending A-school or C-school are in such corporate accounts. The unit has a gapped billet but doesn't associate that gap to a Servicemember in the pipeline. If personnel were assigned to units while in school, the units would have true visibility into the effect of course length, time awaiting instruction, and time awaiting transfer on lost productivity. The unfilled billet is the opportunity cost of the individual. With asset ownership and visibility, units would pressure those managing the pipeline to reduce those times.

Do we have any empirical evidence supporting the detrimental effect of poor cost and asset visibility? Not really. Certainly, part of the

12- to 20-percent extra cost of using military personnel is attributable to the lack of cost visibility. However, we don't have the data to convince anyone of the magnitude. With somewhat of a stretch, we can use another finding from the public-private competitions. Reference [46] examined the competitions at public work centers (PWCs) and public work departments (PWDs). PWCs are known as reimbursable activities, in which customers pay for services and workers are paid from the reimbursements. So the impact of the number of people and their salaries on the costs are evident. Here, higher costs could lead to a reduced workload. PWDs have their own budgets, which cover their payroll, but they don't have to charge for the services they request. They provide a level-of-effort service.

Reference [46] asked two questions:

1. Do competitions at PWDs produce bigger savings?

2. Do PWDs win fewer competitions?

The results were supportive, but only weakly supportive, of the value of cost visibility. The savings at PWDs were higher. But, the 8- to 9-percent additional savings at PWDs were not statistically significant. For the second question, the results were stronger. The PWDs won fewer competitions. This could mean that the nature of the funding makes the PWDs less able to reduce costs but does not otherwise affect their efficiency.

Another finding suggests that reimbursable activities are more responsive to workload changes. The public shipyard workforce, staffed predominantly with reimbursable civilian personnel, shrank with the Navy's fleet, while Ship Intermediate Maintenance Activities, with military personnel not in the organizations' budgets, did not decline with what should have been a decline in workload. Our explanation is that there are fewer signals adjusting the supporting activities' resources to the workload.

One-year money

Several constraints force manpower costs to appear effectively as zero in execution. The military personnel funds are known as *one-*

year money. That is, the money is expected to be spent in the year for which it is authorized. Coming in on budget is a big management challenge because a Service can have a serious problem by being off by just one-third of one percent in the military personnel budget, which is equivalent to only one day of payroll for the force. Money left at the end of the year is lost, and overspending is illegal. Money that will be lost has a zero cost associated with its expenditure. In other words, a dollar that is lost on 1 October is worth nothing on that day; if that dollar can give a return of just one cent on 30 September, it is worth the expenditure in the eyes of both the individual units and the military Service.

This constraint creates some odd incentives. Since permanent-change-of-station moves are in the MilPers budgets, moves will be delayed or sped up depending on whether current funds are available.[28] Promotions can also be sped up or delayed to hit the budget. New recruits can be held back until October or moved up to September. The purpose of all of these actions is to stay within the one-year budget; such actions are not taken to improve mission performance.

Endstrength requirements

There is a military endstrength and budget constraint for each Service. With almost 100 percent certainty, these constraints will be inconsistent in execution, and one will become a binding constraint before the other is reached. It seems to serve no military purpose; intended or not, it serves to overly constrain the Services as they perform their jobs. And adding constraints almost always adds to the cost.

There has been some discussion of having a manpower constraint other than endstrength. However, any constraint on the number of people, when added to the constraint on the budget, is bound to

[28] Pulling these funds out of military personnel budgets is unlikely to solve the problem. The likely appropriation to move it to is Operations and Maintenance, which is also one-year money. Putting it into its own appropriation as two-year money solves one problem, but it further stovepipes our budgets and limits tradeoffs in execution.

lead to inconsistent objectives. In fact, a constraint on monthly end-strength or average strength would make this an even more complicated problem for manpower managers.

Endstrength is not a pure output measure, even within the narrow framework that accepts a one-to-one relationship between warfare requirements and manpower requirements. Endstrength includes those in training and those in transient, patient, prisoner, and holdee accounts. These are all linked to the operational billet requirements, but they are also determined by the personnel policies we have set to achieve them. If one wanted to retain an endstrength metric, it could be argued that operational endstrength would be the better metric, but that also has its limits. Operational endstrength is seasonal and is at a relatively low level on 30 September, when many have already completed their initial contractual obligation and the new recruits have not yet completed their training.

Since the budget constraint is constructed from an average strength and a planned paygrade distribution, one could argue that it already implicitly incorporates congressional approval of the force size. During execution, we could allow the Services discretion in adjusting the numbers and paygrade distribution within the budget constraint. This would be similar to the manage-to-payroll approach used for civilians several years ago. Alternatively, a less restrictive approach that still includes an endstrength constraint would allow a band around a target, with Service discretion within the band.

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Conclusions

Military service is a way of life with many non-pay-related attributes attached to it. The nature of the service and the profession closely ties the job and one's lifestyle in a way that makes all nonmonetary benefits and attributes very important. Key points for military compensation and manpower policy-makers follow:

- The non-pay-related attributes of military service could add value (compensation) or could reduce the value (lower perceived compensation) of military service.
- Military planners need to appreciate the value added and subtracted of all the attributes when developing the total compensation package.
- Servicemembers and prospective Servicemembers differ in their tastes and in how they value the many attributes of the military.
- Given the range of tastes, military planners should weigh heavily individual preferences and consider giving people choices when those choices do not negatively affect the military mission.

This paper argues that there are strong reasons to believe that the Services are not aligning the compensation package (broadly defined) with what personnel most value. Three examples follow:

- Training is highly valued by recruits and potential recruits. They tell us that in surveys. DoD should consider enhancing the value of this part of its compensation package. Existing programs consistent with this idea are the Student Loan Repayment Program and partnerships with colleges to award credit to students for military training, coursework, and occupational specialty.

- Frequent rotation can significantly detract value from military service, particularly for married personnel. Studies show significantly lower income of military spouses. Programs that allow personnel choice in their assignments would reduce the cost and improve the value of the overall compensation package relative to the civilian sector.

- Retirement does not have a value to personnel commensurate with its significant cost to DoD. In surveys, young people put little value on it, and studies show that such distant income has low value to youth. Changes that allow for vesting, variable separation pays, and portability would make future compensation more valuable to personnel and remove the "all-or-none" quality of the current 20-year retirement system.

Our second major point is that there is reason to believe that current manpower requirements are too large and possibly have the wrong mix of people for the job. There are probably many reasons for the differences between "requirements" and what others need to do the same task. We identified three—limited experience, frequent rotation, and poor cost visibility:

- *Inexperience* reduces the performance of units. Policies that would make better use of the experience the Services currently have and increase experience further are (a) using experienced people more in units that require that experience and (b) allowing those reaching their high tenure point to stay longer.

- *Frequent rotation* reduces performance of units, in addition to detracting from the value of military service. Policies that would help here are ones that would extend minimum tour lengths and offering pay differentials for working in tours using one's training.

- Military personnel *costs are not visible* to those justifying requirements and to those deciding how to use the personnel they have. Policy changes that would improve this are (a) including manpower costs in execution budgets, (b) eliminating constraints on number of personnel (such as imposed on endstrength), and (c) relaxing the one-year expiration date rule on military personnel budgets.

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